[0064] Still further, the configuration and arrangement of the preferred burner assembly provides improved aerodynamics. The configuration and arrangement of the preferred burner assembly more rapidly, completely, and uniformly mixes fuel and air, thereby providing a more rapid combustion, improving combustion intensity, reducing the combustion space required in the asphalt drum, and reducing CO emissions in the combustion space. The improved aerodynamics of the preferred burner assembly results in reduced energy consumption and body pressure. In addition, the improved aerodynamics of the preferred burner assembly produces a more free flowing burner assembly. Still further, the preferred burner assembly results in reduced noise levels during operation and reduced NOx emissions.

[0065] Additionally, the preferred burner assembly is capable of firing on low excess air pre-mix gas. The preferred burner assembly produces a stabilizing gas base flame. The preferred burner assembly is also less complicated and expensive to manufacture, operate and maintain than conventional burner assemblies.

[0066] Finally, the preferred burner assembly reduces the temperatures in the area of the burner flame and the resulting damage to components in the area of the burner flame. The preferred burner assembly also reduces the exposure to debris produced in the combustion chamber experienced by components in the area of the burner flame. Although this description contains many specifics, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments thereof, as well as the best mode contemplated by the inventors of carrying out the invention. The invention, as described herein, is susceptible to various modifications and adaptations, as would be understood and appreciated by a person having ordinary skill in the art to which the invention relates.

What is claimed is:

1. A burner assembly comprising:

(a) a housing having an air inlet and a burner end having an opening;

(b) a motor;

(c) an impeller mounted in the housing, said impeller being in fluid communication with the air inlet, in mechanical communication with the motor and adapted to direct air from the air inlet towards the burner end of the housing;

(d) at least one pre-mix gas injection nozzle mounted in the housing, each of said at least one pre-mix gas injection nozzle having at least one orifice adapted to direct gaseous fuel into the housing;

(e) a spin vane comprising at least one spin vane blade, said spin vane being mounted in the burner end of the housing and adapted to direct the flow of air in the burner end; and,

(f) an igniter mounted in the burner end of the housing, said igniter being adapted to ignite the air and fuel mixture in the burner end of the housing to produce a main flame.

2. The burner assembly of claim **1** wherein the motor is a variable speed motor.

3. The burner assembly of claim **1** wherein the at least one pre-mix gas injection nozzle is mounted about the periphery of the housing.

4. The burner assembly of claim **1** wherein each of the at least one orifice in the at least one pre-mix gas injection nozzle has a diameter of no more than about 0.125 inches.

5. The burner assembly of claim **1** wherein the spin vane is fixedly mounted in the burner end.

6. The burner assembly of claim **1** wherein each of the at least one spin vane blade of the spin vane is tapered.

7. The burner assembly of claim **1** wherein each of the at least one spin vane blade of the spin vane has a non-planar cross-sectional shape.

8. The burner assembly of claim **1**, further including:

(g) an air deflector mounted in the housing, said air deflector being adapted to direct air flow from the impeller to the burner end.

9. The burner assembly of claim **1**, further including:

(h) a transition section located downstream of the impeller and adapted to direct air flow from the impeller to the burner end.

10. The burner assembly of claim **1**, further including:

(i) a seal skirt mounted adjacent to the burner end, said seal skirt being adapted to prevent air from entering a dryer drum.

11. The burner assembly of claim **1**, further including:

(j) a heat shield mounted adjacent to the burner end, said heat shield being adapted to be attached to a rotating dryer drum and prevent air from entering said dryer drum.

12. The burner assembly of claim **1**, further including:

(k) at least one screen mounted in the housing of the burner assembly downstream from the impeller.

13. The burner assembly of claim **12** wherein the at least one screen mounted in the housing of the burner assembly downstream from the impeller includes a straightening screen adapted to produce a uniform air flow velocity in the burner assembly and a mixing screen adapted to produce a uniform air flow velocity in the burner assembly and mix combustion air and fuel in the burner assembly.

14. The burner assembly of claim **1**, further including:

(l) a pre-mix cone located downstream from the impeller and adapted to direct air flow from the impeller to the burner end.

15. The burner assembly of claim **14** wherein the pre-mix cone has an included angle of approximately 15°.

16. The burner assembly of claim **1**, further including:

(m) a converging focusing cone located in the burner end, said converging focusing cone being adapted to accelerate the velocity of air flow in the burner end.

17. The burner assembly of claim **16** wherein the converging focusing cone is removably mounted to the burner assembly.

18. The burner assembly of claim **1**, further including:

(n) a diverging conical discharge section located in the burner end.

19. The burner assembly of claim **18** wherein the diverging conical discharge section includes at least one expansion and contraction crease.

20. The burner assembly of claim **1**, further including:

(o) an primary air tube mounted within the housing, said primary air tube having an inlet end and an outlet end, said inlet end being located downstream of the impeller and said outlet end being located in the burner end;

(p) an atomizing nozzle located at the outlet end of the primary air tube;

(q) a liquid fuel supply tube mounted within the primary air tube, said liquid fuel supply tube being adapted to convey liquid fuel to the atomizing nozzle;

(r) a swirl plate mounted around the periphery of the outlet end of the primary air tube;